REMARKS

Claims 8 and 15 have been canceled. Claims 1, 9, 12, 13, 16, 19, 20 and 24 have been amended. Claims 1-7, 9-14 and 16-25 are pending in this application.

Claims 8, 12, 14, 15, 19, 23 and 24 stand objected to as being of improper dependent form "for failing to further limit the subject matter of a previous claim." (Office Action at 2). Claims 8 and 15 have been canceled and claims 12, 19 and 24 have been amended to overcome the objection.

Claim 24 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for "failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention." (Office Action at 2-3). In particular, claim 24 stands rejected as "[I]t is unclear how the second doped layer is provided before the first." (Office Action at 3). Claim 24 has been rewritten in independent form to overcome any perceived indefiniteness. Applicant notes that all pending claims are now in full compliance with 35 U.S.C. §112.

Claims 20-22 and 24 stand rejected under 35 U.S.C. §102 as being anticipated by Chen et al. (U.S. Patent No. 5,482,881) ("Chen"). This rejection is respectfully traversed.

The claimed invention relates to a method of forming a source pocket on a substrate. As such, amended independent claim 20 recites a "method of forming a source region in a substrate" by *inter alia* "forming a pair of gate structures which extend in a first direction over a substrate" and "altering the upper surface profile of said substrate to form alternating areas of higher substrate surface elevation and areas of lower substrate surface elevation along said first direction and between said pair of gate structures." Amended independent claim 20 also recites "providing a first doped layer in said substrate between said gate structures which has a profile which follows that of said upper surface profile" and "providing a second doped layer . . . which is below said first doped layer and which has a

profile which follows that of said first doped layer, wherein said act of providing said second doped layer is carried out with an implanting energy higher than an implanting energy for said first doped layer."

Chen relates to a "flash EEPROM having reduced column leakage current." (Abstract). Chen teaches that "[S]ource 112 and drain 114 regions . . . are conventionally formed by initially implanting n-type dopants with a conventional double diffusion implant (DDI) . . . to form a deeply diffused but lightly doped N well 130." (Col. 6, lines 55-63; Figures 1 and 4B). Chen also teaches that "[A] shallow second implant, commonly referred to as a medium diffused drain (MDD) implant, is then performed (e.g. with arsenic) . . . to create a more heavily doped, but shallower, n+ well 132 embedded within deep N well 130." (Col. 7, lines 1-5; Figure 4D).

Chen does not disclose or suggest the limitations of claims 20-22 and 24. Chen does not teach or suggest "providing a first doped layer in said substrate" and "providing a second doped layer . . . which is below said first doped layer and which has a profile which follows that of said first doped layer, *wherein said act of providing said second doped layer is carried out with an implanting energy higher than an implanting energy for said first doped layer.*" (emphasis added). Chen specifically teaches that the n+ well 132, which would arguably correspond to the second doped layer of the claimed invention, is a shallow layer which is "embedded within deep N well 130," which would arguably correspond to the first doped layer of the claimed invention. (Col. 7, lines 1-5; Figure 4D). Accordingly, in Chen, the formation of the n+ well 132 could not have been "carried out with an implanting energy higher than an implanting energy for said first doped layer," as in the claimed invention. For at least these reasons, Chen fails to disclose the limitations of amended independent claim 20 and withdrawal of the rejection of claims 20-22 and 24 is respectfully requested.

Claims 1-7, 9-14, 16-19 and 23 stand rejected under 35 U.S.C. §103 as being unpatentable over Chen et al. (U.S. Patent No. 5,482,881) ("Chen"). This rejection is respectfully traversed.

As noted above, the claimed invention relates to a method of forming a source pocket on a substrate. As such, amended independent claim 1 recites a "method of forming a plurality of dopant pockets on a substrate" by *inter alia* "forming a plurality of implantable regions on said substrate separated by field oxide regions" and "forming a plurality of word lines located over said implantable regions and field oxide regions." Amended independent claim 1 also recites "removing portions of said field oxide regions between two adjacent word lines to expose respective substrate regions" and "forming source regions in said implantable regions." Amended independent claim 1 further recites "subsequently implanting a dopant into said substrate through said respective substrate regions to form said dopant pockets beneath said source regions."

Amended independent claim 13 recites a "method of forming source regions with boron pockets on a substrate of a flash memory" by *inter alia* "forming a pair of adjacent spaced word lines over" a field oxide layer and "removing said field oxide layer from predefined regions located in between said spaced word lines to expose respective substrate regions." Amended independent claim 13 also recites "forming a source region in between said word lines" and "subsequently implanting boron into said substrate in between said word lines to form a boron pocket beneath said source region."

The subject matter of claims 1-7, 9-14, 16-19 and 23 would not have been obvious over Chen. Indeed, the Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355, 47 U.S.P.Q.2d 1453, 1456 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573, 37 U.S.P.Q.2d 1626, 1630 (Fed. Cir. 1996).

In the present case, Chen does not teach or suggest all limitations of amended independent claims 1 and 13. Chen does not teach or suggest "forming source regions in said implantable regions" and "*subsequently implanting a dopant* into said substrate through said respective substrate regions to form said dopant pockets *beneath* said source regions," as amended independent claim 1 recites (emphasis added). Chen teaches that the source region 112 is formed by "initially implanting n-type dopants with a conventional double diffusion implant (DDI) . . . to form a deeply diffused but lightly doped N well 130" and then conducting "[A] shallow second implant . . . to create a more heavily doped, but shallower, n+ well 132 embedded within deep N well 130." (Col. 6, lines 55-63; Col. 7, lines 1-5; Figures 1, 4B, 4D). Thus, Chen does not teach the step of "subsequently implanting a dopant into said substrate . . . to form said dopant pockets *beneath* said source regions," as amended independent claim 1 recites. In fact, even if *arguendo* the deep N well 130 of Chen would be considered a source region, Chen teaches forming "n+ well 132 *embedded* within deep N well 130," and not "subsequently implanting a dopant into said substrate . . . to form said dopant pockets *beneath* said source regions," as in the claimed invention.

Similarly, Chen fails to teach or suggest the limitations of amended independent claim 13. Chen is silent about "forming a source region in between said word lines" and "subsequently implanting *boron* into said substrate in between said word lines," much less about implanting boron into said substrate "to form a boron pocket *beneath* said source region," as amended independent claim 13 recites. Chen teaches only that "[S]ource 112 and drain 114 regions . . . are conventionally formed by . . . implanting n-type dopants." (Col. 6, lines 55-63; Figures 1 and 4B). Chen is silent, however, about any dopant implantation subsequent to the formation of the source/drain regions and beneath the source/drain regions, much less about p-type dopant implantation, such as boron implantation, "to form a boron pocket *beneath* said source region," as amended independent claim 13 recites. For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness and withdrawal of the rejection of claims 1-7, 9-14, 16-19 and 23 is respectfully requested.

A marked-up version of the changes made to the specification and claims by the current amendment is attached. The attached page is captioned "**Version with markings to show changes made.**"

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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Version With Markings to Show Changes Made

1. (Amended) A method of forming a plurality of dopant pockets on a substrate comprising:

forming a plurality of implantable regions on said substrate separated by field oxide regions, said implantable regions and field oxide regions extending in a first direction;

forming a plurality of word lines located over said implantable regions and field oxide regions, said word lines extending in a second direction perpendicular to said first direction;

removing portions of said field oxide regions between two adjacent word lines to expose respective substrate regions;

forming source regions in said implantable regions; and

subsequently implanting a dopant into said substrate through said respective substrate regions to form said dopant pockets beneath said source regions.

9. (Amended) The method of claim [8] 1, wherein said act of implanting said dopant is carried out with an implanting energy higher than implanting energy used to form said source regions.

12. (Amended) [The method of claim 7,] A method of forming a plurality of dopant pockets on a substrate comprising:

forming a plurality of implantable regions on said substrate separated by field oxide regions, said implantable regions and field oxide regions extending in a first direction;

forming a plurality of word lines located over said implantable regions and field oxide regions, said word lines extending in a second direction perpendicular to said first direction;

removing portions of said field oxide regions between two adjacent word lines to expose respective substrate regions;

forming source regions in said implantable regions; and

implanting a dopant into said substrate through said respective substrate regions to form said dopant pockets beneath said source regions, wherein said act of implanting said dopant into said substrate is carried out [after] before said act of forming said source regions.

13. (Amended) A method of forming source regions with boron pockets on a substrate of a flash memory, said method comprising:

forming a field oxide layer over said substrate;

forming a pair of adjacent spaced word lines over said field oxide layer;

removing said field oxide layer from predefined regions located in between said spaced word lines to expose respective substrate regions;

forming a source region in between said word lines; and

subsequently implanting boron into said substrate in between said word lines to form a boron pocket beneath said source region.

16. (Amended) The method of claim [15] 13, wherein said act of implanting boron is carried out at with an implanting energy higher than an implanting energy for said source region.

19. (Amended) [The method of claim 14] A method of forming source regions with boron pockets on a substrate of a flash memory, said method comprising:

forming a field oxide layer over said substrate;

forming a pair of adjacent spaced word lines over said field oxide layer;

removing said field oxide layer from predefined regions located in between said spaced word lines to expose respective substrate regions;

forming a source region in between said word lines; and

implanting boron into said substrate in between said word lines to form a boron pocket beneath said source region, wherein the act of implanting boron into said substrate is carried out before said act of forming said source region.

20. (Amended) A method of forming a source region in a substrate comprising:

forming a pair of gate structures which extend in a first direction over a substrate;

altering the upper surface profile of said substrate to form alternating areas of higher substrate surface elevation and areas of lower substrate surface elevation along said first direction and between said pair of gate structures;

providing a first doped layer in said substrate between said gate structures which has a profile which follows that of said upper surface profile; and

providing a second doped layer in said substrate between said gate structure which is below said first doped layer and which has a profile which follows that of said first doped layer, wherein said act of providing said second doped layer is carried out with an implanting energy higher than an implanting energy for said first doped layer.

24. (Amended) [The method of claim 20,] A method of forming a source region in a substrate comprising:

forming a pair of gate structures which extend in a first direction over a substrate;

altering the upper surface profile of said substrate to form alternating areas of higher substrate surface elevation and areas of lower substrate surface elevation along said first direction and between said pair of gate structures;

providing a first doped layer in said substrate between said gate structures which has a profile which follows that of said upper surface profile; and

providing a second doped layer in said substrate between said gate structure which is below said first doped layer and which has a profile which follows that of said first doped layer, wherein said act of providing said second doped layer is carried out with an implanting energy higher than an implanting energy for said first doped layer and wherein said second doped layer is provided in said substrate before said first doped layer.